IOT CIA-1

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1 A Comprehensive Study Of Architecture, Protocols And Enabling Applications In Internet Of Things (Iot) Srinivasa A H, Dr.Siddaraju

The paper proposes the study of the IoT architecture in detail. The architecture is in the form of layers and the paper covers each layer in detail. The paper also covers the components and challenges of IoT.

IOT ARCHITECTURE: The architecture can be in the form of layers and the layers are named as a business layer, application layer, middle layer, network layer, and the perception layer.

1. Business layer: The business layer manages the IoT system services and activities. The business layer can be used for To develop, design, analyze, implement, evaluate and to monitor the IoT system related elements.Building business models, graphs and flowcharts are the primary functions of this layer. To develop, design, analyze, implement, evaluate and to monitor the IoT system related elements business layer can be used. The IoT business models differ according to the different layers. Immaturity of innovation: It refers to the huge number of emerging technologies, components, devices and IoT platforms. To serve different levels of IoT maturity and adoption, different IoT business models can be identified. Each business model plays an important role in an IoT stakeholder organization's overall IoT strategy. To define the IoT business models, it needs to address the IoT challenges. The four dimensions, who, what, how and why are considered for illustration of the business model architecture. New innovative IoT business models are required for new revenue opportunities and risks.

2. Application Layer: The application layer is used to build applications to satisfy the needs of the business. It builds a variety of applications. The layer includes key technologies such as distributed computing, intelligent processing of massive information, information findings. The layer covers the application such as intelligent transportation, intelligent logistics, smart city, environmental monitoring, ehealth and precision agriculture. It also provides global facilities to manage the applications. In this system, vehicles are equipped with RFID tags, sensors and actuators with some embedded system. The embedded system

can gather important information and send it to the traffic control for better routing, congestion control. The sensors and actuators available in the vehicle can avoid the collisions and also prevents the accident. IoT facilitates assets tracking, remote fleet management in intelligent logistics. Generally, IoT can be used in logistics to provide real-time tracking and monitoring solutions.In a smart city, the data use should ensure the reusability of the data for different applications. The collected data accuracy can be maintained when data are shared among critical applications and services. It has many end users like government agencies, citizens, industrial patterns, etc. there may be a set of requirements and services for each end user in any smart city. Some of the environmental monitoring are controlling air pollution, waterways, noise monitoring, industry monitoring.Depending on the application different sensors are used. For example, noise pollution can be a monitor with the help of atmospheric dioxide sensors. (i)Application layer protocol: It is required to consider the protocols which can handle the communication between the gateways, internet, and the final applications. The application layer protocols are used for command carrying from application to end devices and also toupdate servers with the devices' latest values. The protocol aims to minimize the bandwidth requirement and guarantee the reliability of packet delivery.The main features of the protocol: support of multicast communication, the stablishment of communication between remote devices and the minimization of network traffic. . MQTT is suitable for many IoT applications because it is a lightweight protocol. This protocol runs over TCP/IP, so it provides ordered, lossless bidirectional connections. AMQP: It is same as MQTT but has the advantage to store data and then forward it.

3. Middleware Layer: This layer exists between the application and network layer. The main task of this layer is to hide details of the hardware and allows developers to concentrate on the application development process. The devices used are constantly available and completely connected. It enables the IoT application programmers to work with heterogeneous objects without considering a specific platform. This layer also processes the received data, makes a decision, and delivers required services over the network. The process characterized by meaningful abstractions from the raw data. The meaningful abstractions to be in a human and or machine-understandable form.

4. Network Layer: In IoT, the main function of this layer is information transmission across the network. [24] This layer can handle the risks such as the denial of service attacks, unauthorized access; man-in-the-middle attacks, virus attacks, confidentiality, the integrity of data. It can be implemented in the basic communication framework. Generally, IoT involves sensing and acquisition of data from heterogeneous data with heterogeneous data formats and character. In the transferring of these data in IoT can lead to complex network related problem such as congestion. The network layer should maintain reliable data fusion, transmission, mining and communication. (i) Secure transmission: Secure transmission is the important asset in IoT which gives assurance to error-free communication. (ii) Wireless technologies: NFC (Near Field Communication): It is a short range that is less than 1 meter and high frequency

such as 13.56 MHz RFID technology used to exchange information between two NFC enabled devices. It helps in simplifying the connection of devices in contactless applications. These are low cost and consume low or zero power for operation. These are ideal for IoT connectivity in devices that need to connect occasionally. (iii) Low Power Wide Area Network (LPWAN) Technologies: SigFox: It is a low power wireless technology for communicating objects with a different range of low energy. These can be generally used in sensors and M2M applications. It can cover a range up to 50 km. SigFox uses Ultra Narrow Band (UNB) technology which can be designed to handle low data transfer speeds from 10 to 1000 bits per second and can run on a small battery. It supports star network topology. Cellular: If any IoT application requires operation over longer distances then cellular communication capabilities such as GSM/3G/4G can be used. (iv) Network layer protocols In IoT application, many protocols can be used for routing. These protocols can be categorized as standard and nonstandard. The network layer should be partitioned into two sublayers and they are routing layer and the encapsulation layer. Routing layer handles the packet transfer from source to destination. Advantages: This protocol does not require translation gateways for accessing the nodes within the network from the outside world and provide end to end IP based solution. Dynamic adaptation of control messages sending rating of the routing in the unstable network condition. It will consider the optimized network for different application scenarios and deployment. Disadvantages The protocol will not support the multipath routing. It will not consider the load and energy balancing

5. Perception Layer: The perception layer is also known as a sensing layer. The main function of this layer is to get a data sample from the environment using different kinds of perception devices. It also processes the data to obtain useful information and then transmits to the network layer through the network access devices such as WSN gateways. The layer consists of integrated hardware for the acquisition of data and perception. The most popular sensing technologies are RFID, Camera, sensors, barcode and others. RFID tags may be active or passive and embedded into objects for automatic identification. RFID technology plays an important role in solving issues of objects identification for IoT applications. Active RFID tags are used in auto manufacturing and remote monitoring applications.

IOT CHALLENGES: IoT applications development is not so easy task due to challenges of IoT. The main challenges are Mobility, reliability, scalability, management, availability, interoperability, security and privacy. So, the mobility is one of the major issues in IoT. Some routing protocols such as RPL can manage such a mobility problem. IoT applications development is not so easy task due to challenges of IoT. The main challenges are Mobility, reliability, scalability, management, availability, interoperability, security and privacy. So, the mobility is one of the major issues in IoT. Some routing protocols such as RPL can manage such a mobility problem. Providers of such devices are responsible for fault management, configuration, performance, accounting of their devices and each aspect. The service provided to ensure systems are running and available most of the time is known as software availability. The service which guarantees the availability of hardware is known as hardware availability. Both hardware and software should be compatible with IoT protocols, functionality and compact with the constrained devices.

CONCLUSION: It is represented in this paper that there is a comprehensive key research efforts on architecture, protocols and applications in an Internet of Things ubiquitous environment. The development of IoT applications is technically complex due to the presence of different IoT protocols, lack of industry standards and interoperability issues.